

DIAX04 Drive With Servo Function, Analog- And Parallelinterface

Drive Configuration: ASE 02VRS

SYSTEM200

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- Purpose of Documentation** This documentation serves to identify the designation for a configured drive of the DIAX04 drive family, based on:
- Determining the motor type
 - Choosing the motor - motor feedback combination
 - Choosing the desired function of the drive control device
- In addition, an overview is provided of the available basic functions and possible additional functions.

Record of Revisions

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Notes

1 Determining the Drive Configuration

1.1 Explanation of Terms

Digital drive controllers of the type DIAX04 can be adapted to meet numerous application requirements by using various plug-in modules. For this reason, drive controllers are equipped with ports for plug-in modules.

Basic devices Drive controllers not fitted with plug-in modules are basic units. The following are available:

- HDS 04.1 4 plug-in modules (U1-U4) + software module U5
- HDS 03.1 4 plug-in modules (U1-U4) + software module U5
- HDS 02.1 3 plug-in modules (U1-U3) + software module U5

Plug-in modules The following plug-in modules are available:

- Command interface card.
- Modules for evaluating position measurement systems.
- Input/output modules to evaluate SPS signals or to export signals to the SPS.
- Software modules
- Modules for evaluating analog inputs

Command interface card module

The DEA02.1 plug-in module is used as a command interface card module. This module must always occupy slot U1 in the drive controller.

Configured drive controller

A basic device with fitted with additional plug-in modules is called a configured drive controller.

Hardware configuration

Every hardware configuration is designated by a letter/number sequence, e.g., HS04-01-FW. Digital drive controllers are delivered as configured drive controllers which may be equipped with various components, according to the selected configuration.

The following illustration represents the components of a typical hardware configuration for HDS.

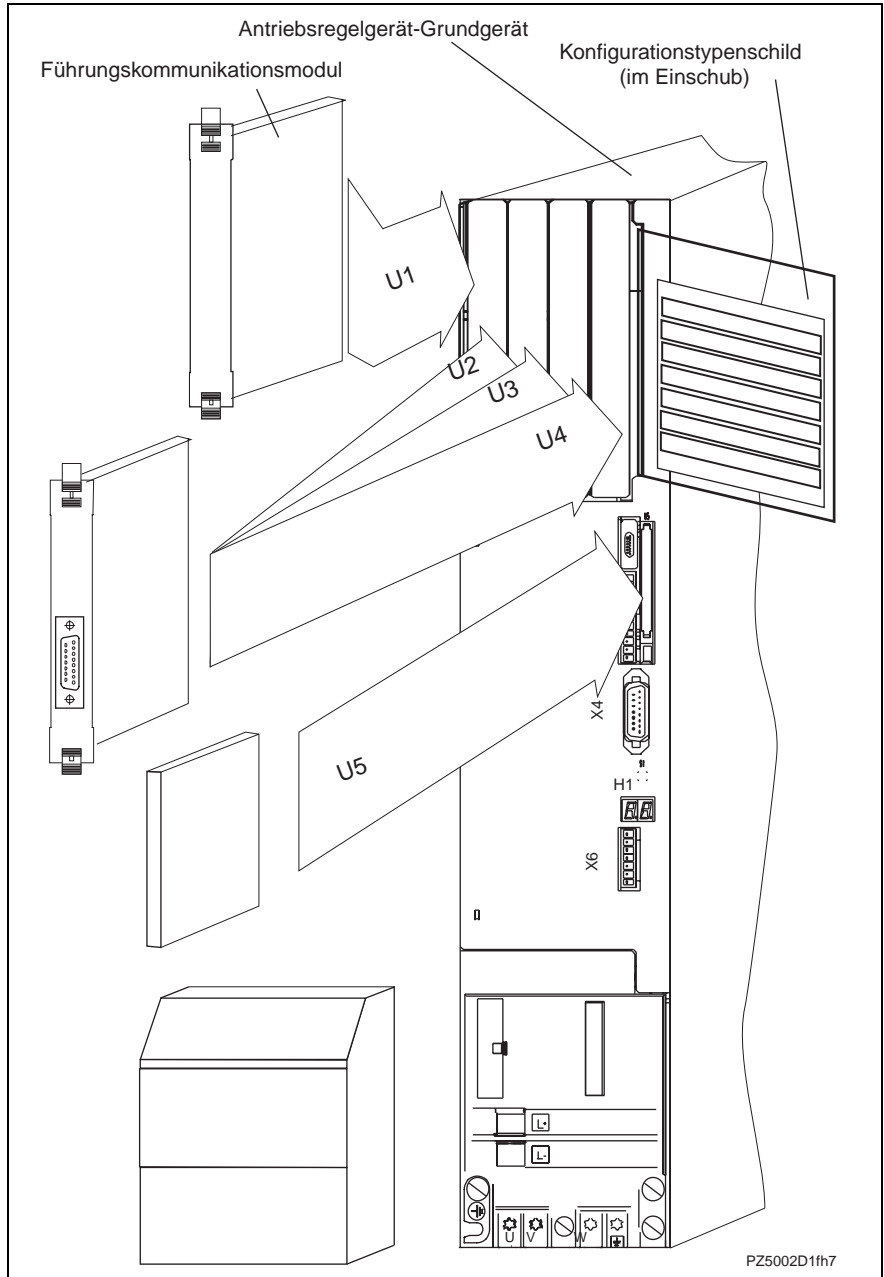


Fig. 1-1: Components of a hardware configuration for HDS

1.2 Procedure

To determine the drive configuration or to specify the hardware configuration labelling of a DIAX04 drive controller for the corresponding machine, we recommend the following procedure:

1. Determine the motor/controller combination:

- Determine rpm/torque requirements for your purpose.
- Select a motor/controller combination from the list.

2. Determine the hardware configuration labelling:

- Motor - Select a motor feedback combination.
- Select the desired features.
- Determine the configuration labelling based on the plug-in modules required for the desired features.

The following two illustrations offer an idea on how to determine the configuration labelling.

Illustration: Determining the motor/controller combination

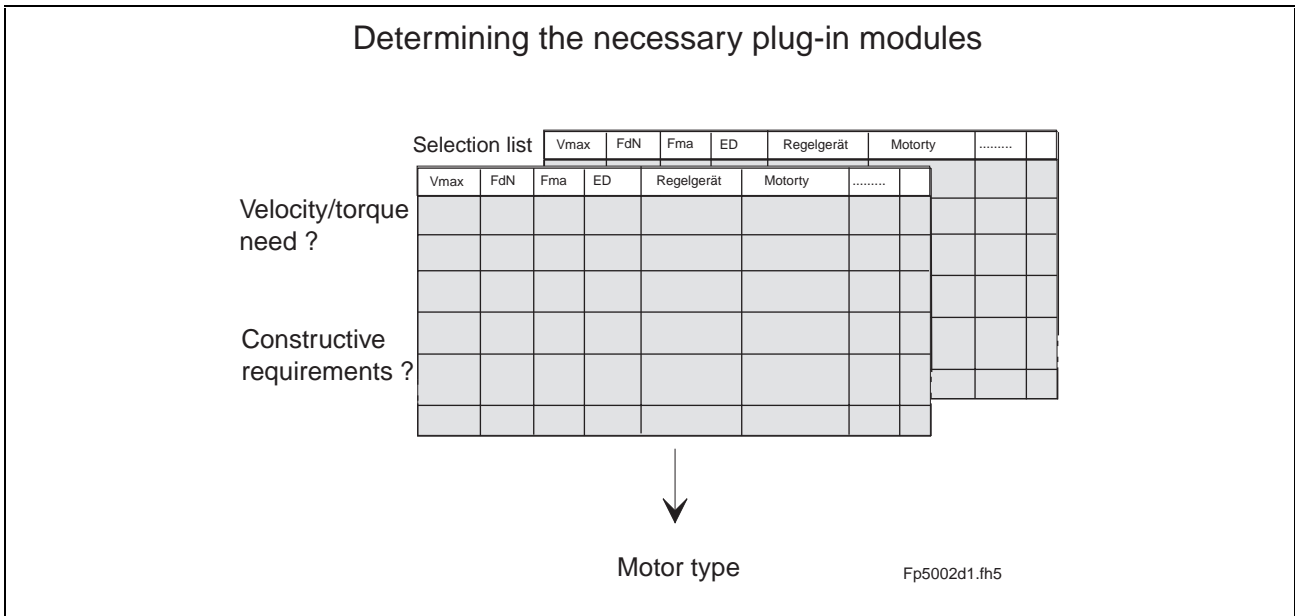


Fig. 1-2: Illustration for working with selection lists

Illustration: Determining the hardware configuration labelling

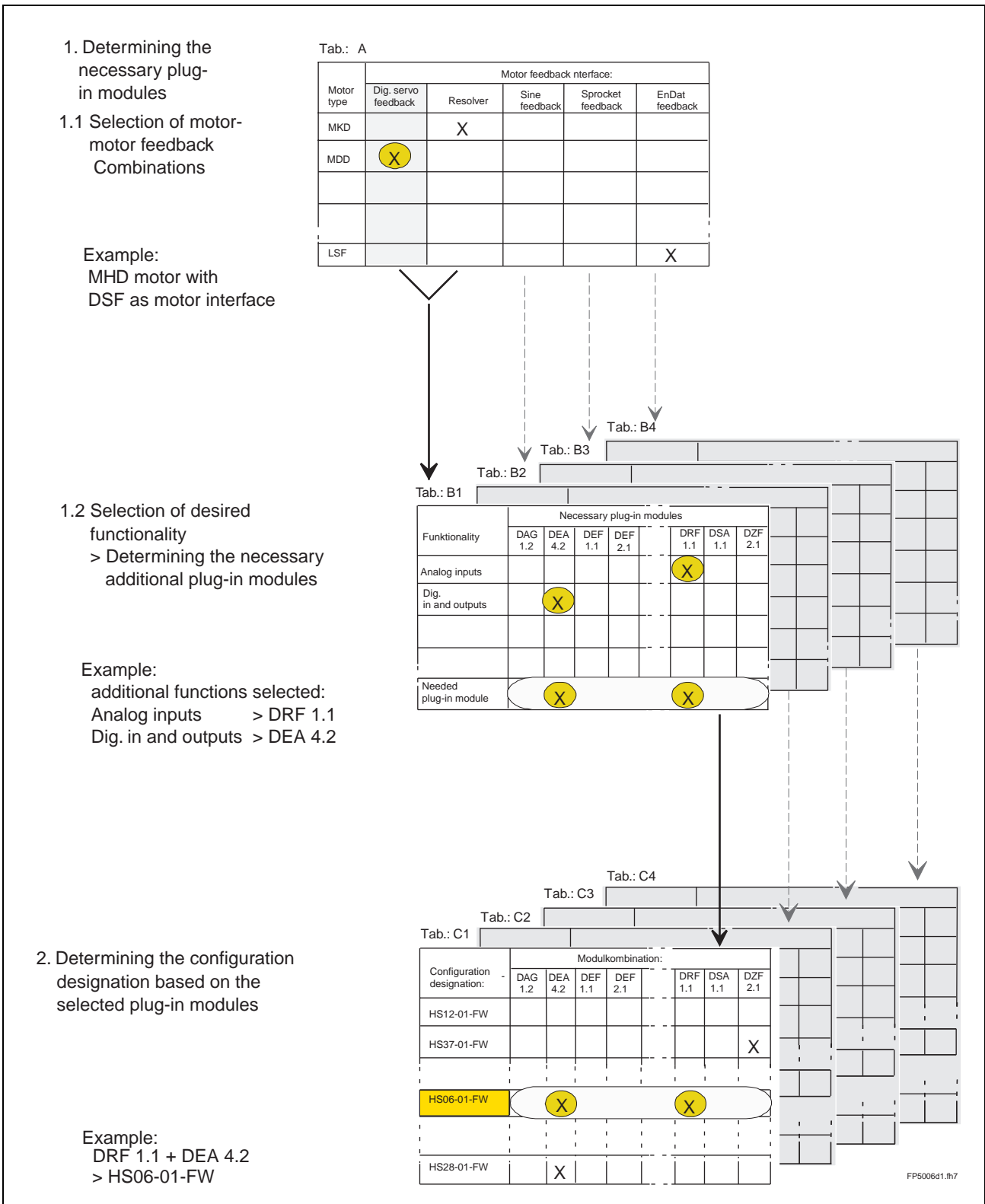


Fig. 1-3: Illustration for determining configuration labelling

Notes

2 Determining the motor/controller combination

2.1 Selection lists

Selection lists can be used to select the required motor controller combination.

You should consider the necessary requirements for torque and velocity just as carefully as the physical requirements.

The **motor type** which you choose from the selection list is the most decisive factor in determining hardware configuration labelling.

Notes

3 Choosing the motor - motor feedback combination

3.1 Possible motor - motor feedback combinations

The following table contains types of motors which correspond to the permissible motor encoder interfaces.

Here you must select the motor encoder interface according to the motor type in use.

Tab A: Motor encoder interface								
Motor feed-back type	HSF (1)	Resolver with FDS (2)	Sine-encoder (3)	Rexroth Indramat gear wheel encoder	EnDat-encoder (4)	Resolver without FDS (5)	Resolver without FDS + sine-encoder (6)	Gear wheel encoder with 1Vpp-signals (7)
P-0-0074*	1	1	2	3	8	10	11	9
MKD		X						
MKE	X	X						
MHD	X							
2AD	X			X				
ADF	X			X				
1MB	X		X	X	X			X
MBW	X		X		X			
LAR			X		X			
LAF			X		X			
LSF					X			
MBS	X				X	X	X	

Fig. 3-1: Permissible motor type - motor/feedback combinations

- (1) : singleturn or multiturn HSF
- (2) : resolver or multiturn resolver (RSF) with feedback data memory (FDS)
- (3) : incremental scale with sine signals or incremental sine rotary encoder with μ A or 1Vpp signals
- (4) : absolute linear scale, singleturn or multiturn rotary encoder with EnDat-Interface
- (5) : resolver without feedback data memory
- (6) : resolver without feedback data memory combined with incremental rotary encoder
- (7) : gear wheel encoder with 1Vpp signals, evaluation via module DZF3.1

* P-0-0074, Motor encoder interface

3.2 Connection examples

HSF/RSF or resolver without feedback data memory

The encoder is connected to the standard interface. Therefore, no other plug-in card is required.

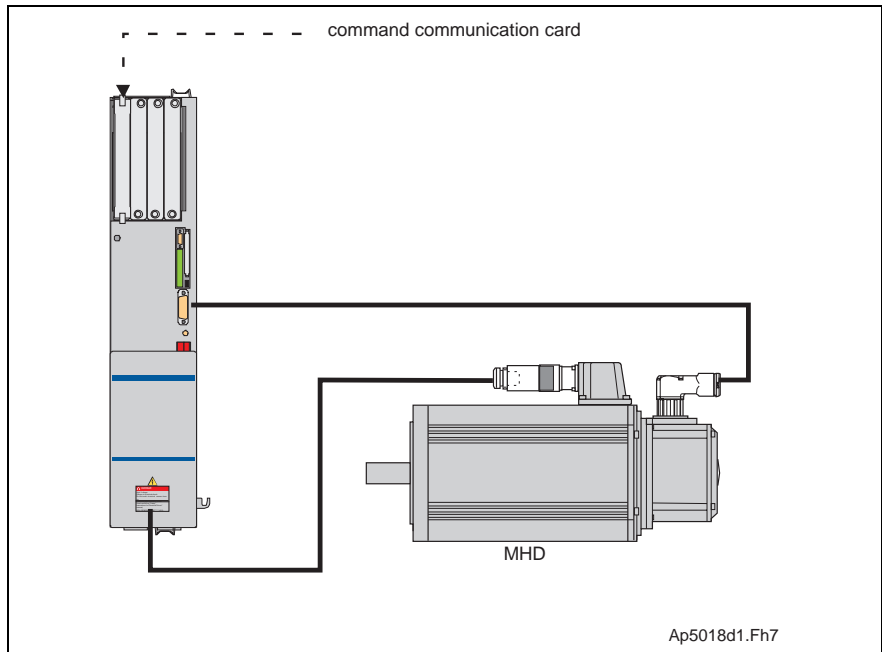


Fig. 3-2: MHD motor with HSF motor encoder to standard interface

Sine encoder

The DLF01.1M plug-in module is required to connect the motor encoder.

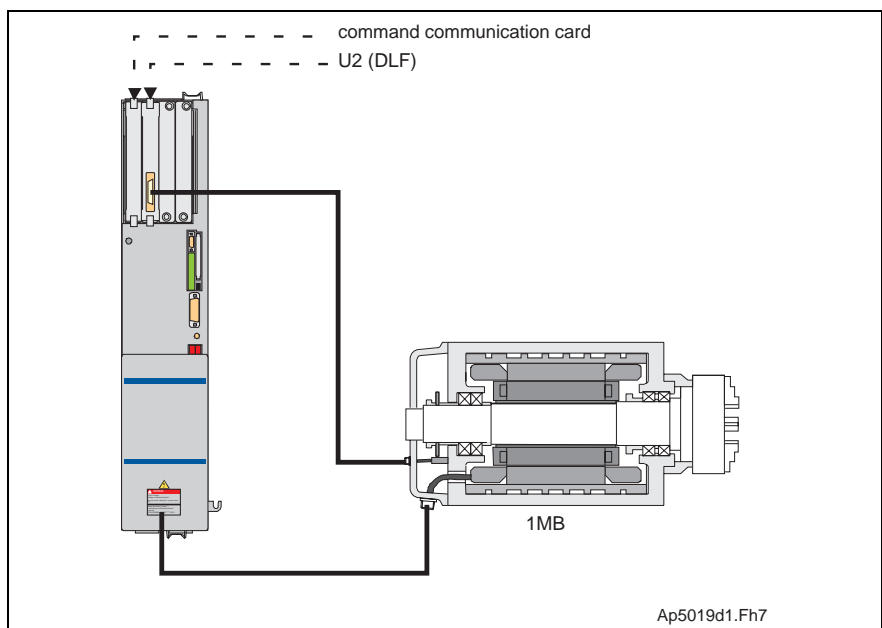


Fig. 3-3: 1MB motor with incremental sine encoder from Heidenhain, connected to a DLF01.1M module

Rexroth Indramat gear wheel encoder

The DZF02.1M module is required to connect the motor encoder.

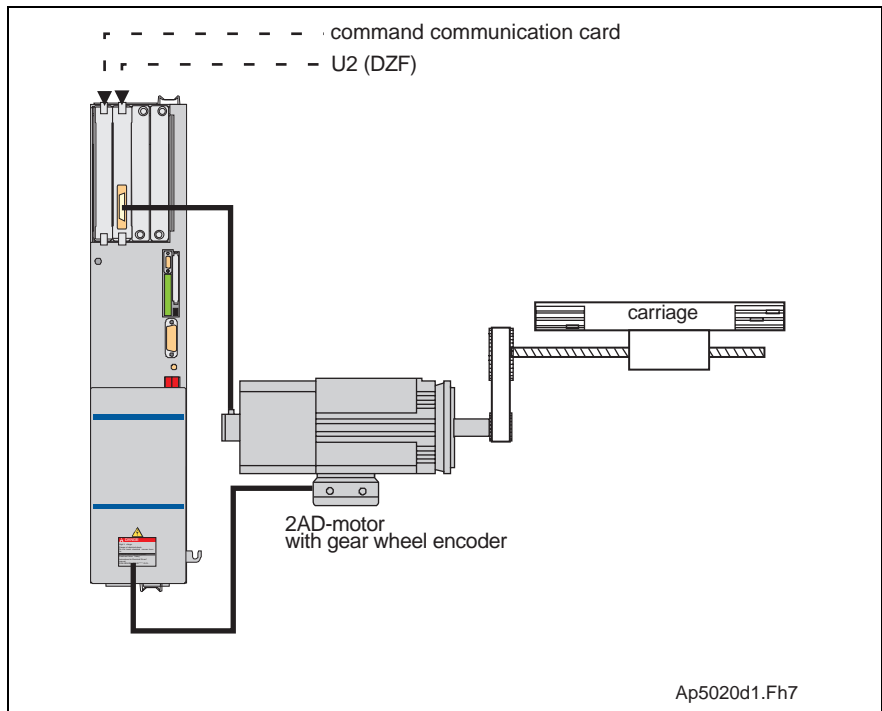


Fig. 3-4: 2AD motor with gear wheel encoder, connected to a DZF02.1M module

EnDat encoder

A DAG01.2M module is required to connect the motor encoder.

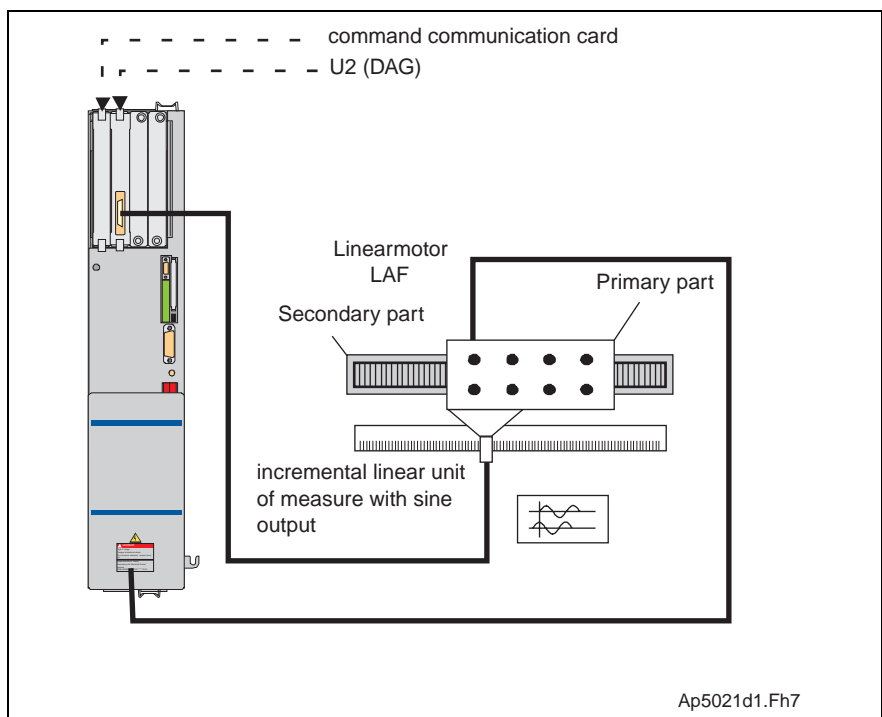


Fig. 3-5: LAF motor with EnDat encoder, connected to a DAG01.2M module

Resolver without feedback data memory + sine encoder

The DLF01.1M plug-in module is needed to connect the optional encoder.

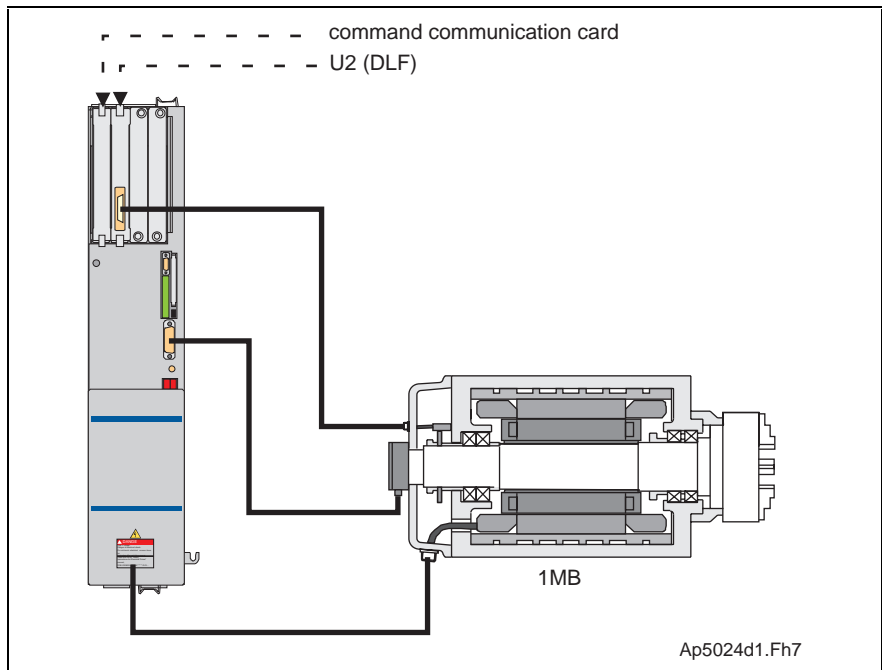


Fig. 3-6: MBS motor with sine encoder on a DLF01.1M plug-in module

Gear wheel encoder with 1Vpp signals

The DZF03.1M plug-in module is needed to connect the motor encoder.

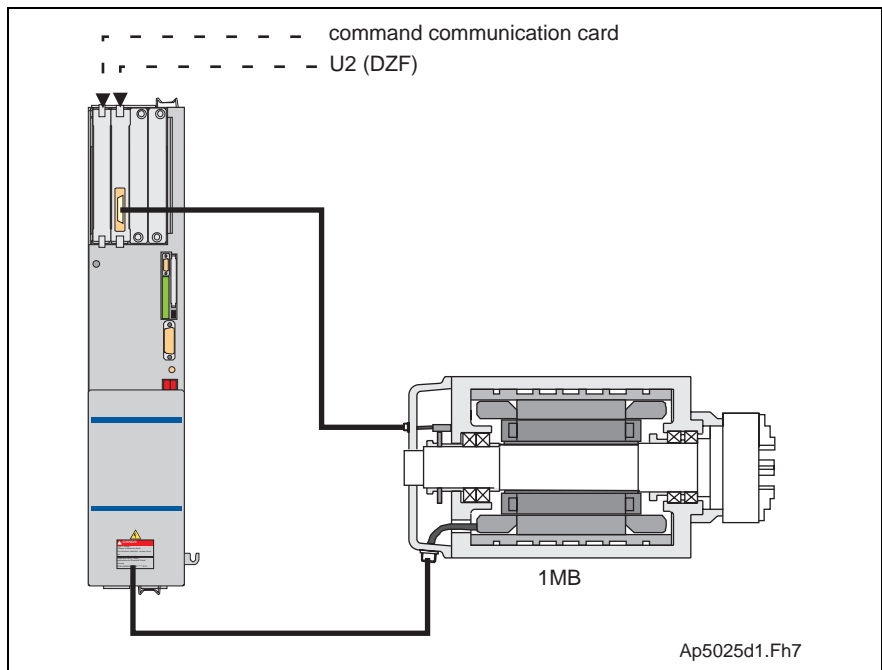


Fig. 3-7: 1MB motor with gear wheel encoder with 1Vpp signals on a DZF03.1M plug-in module

4 Selecting Features - Determining Configuration Labelling

4.1 Basic Features

Independent of the motor type in use, a DIAX04 drive controller offers a wide range of features which are always available. To use these features, **no separate** plug-in module is needed.

The following **basic features** are available:

- Supported operating modes:
 - Torque/force control
 - Velocity control
 - Position control
 - Drive-controlled interpolation
 - Relative drive-controlled interpolation
- Numerous diagnostic possibilities
- Programmable torque/force limits
- Current limitation
- Velocity limitation
- Transversing range limitation
- Driver-side error response:
 - Best possible deceleration "velocity command value zero-switch"
 - Best possible deceleration "torque-free"
 - Best possible deceleration "velocity command value zero-switch with slope and filter"
 - Return motion
 - NC response in error situation
 - Emergency stop feature
- Control loop setting
 - Basic load feature
 - Acceleration feedforward
 - Velocity mix factor
 - Velocity feedforward
 - Friction torque compensation
- Language selection
- Drive Interlock
- Halt drive
- Drive-controlled homing procedure
- Evaluation of absolute measurement systems
- Set absolute measuring

- Analog outputs
- Oscilloscope function
- Probe feature
 - Measurement signal actual feedback value 1/2
 - Measurement signal time
- Modulo feature
- Axis error correction
- "Travel to positive stop" command
- Analog inputs
- Park axis command
- Load base parameters command
- Error memory and operating hour counter
- Freely configurable signal status word
- Customer password

4.2 Selection of additional features

Additional plug-in modules are required	Additional to the basic features DIAX04 offers a range of further features. When you select these additional features which are presented in the following chapters and tables, you should consider that additional plug-in modules will be required.						
Max. number of modules	Depending on the basic device type being used, there may be differences in the number of plug-in modules used. <table border="0" style="margin-top: 10px;"> <tr> <td style="padding-right: 20px;">HDS 04.1</td> <td>max. 4 additional plug-in modules</td> </tr> <tr> <td>HDS 03.1</td> <td>max. 4 additional plug-in modules</td> </tr> <tr> <td>HDS 02.1</td> <td>max. 3 additional plug-in modules</td> </tr> </table> <hr/> <p>Note: One slot is already used for the DAE02.1M communication module in every basic device type.</p> <hr/>	HDS 04.1	max. 4 additional plug-in modules	HDS 03.1	max. 4 additional plug-in modules	HDS 02.1	max. 3 additional plug-in modules
HDS 04.1	max. 4 additional plug-in modules						
HDS 03.1	max. 4 additional plug-in modules						
HDS 02.1	max. 3 additional plug-in modules						
Selection requirements	The following requirements must be taken into consideration when selecting an additional feature: <ul style="list-style-type: none"> • Each module can only be used for one function. • A maximum of one external measurement system may be selected. <p>In contrast to basic features, use of additional features depends on the type of motor or motor encoder interface being used. For this reason, distinctions are made based on the motor encoder interface in the following chapters.</p>						

Motor encoder interface: HSF / RSF or resolver without feedback data memory

If a motor type with a digital servo feedback or a resolver is used, you can then select the Additional features for motor with HSF/RSF or resolver without feedback data memory from the following table.

Depending on your selection, the result will be a number or a combination of required modules.

Using this module combination, you can define the corresponding configuration labelling in the table Configuration selection for motor with HSF/RSF or resolver without feedback data memory which is then used to order the correct components.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

Selection of features for the motor with HSF/RSF or resolver without feedback data memory

Function	Table B1: Plug-in modules:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
Positioning interface		X							
32 universal dig. Inputs 24 universal dig. outputs			X						
external measuring system with sine signals (1Vpp or µA)							X		
external measuring system with rectangular signals (TTL)				X	X				
Ext. measurement system with HSF encoder						X			
Ext. measurement system with SSI interface	X								
Ext. measurement system with EnDat interface (Heidenhain)	X								
Ext. measurement system with gear wheel encoder (Indramat signal spec.)								X	
Ext. measurement system with gear wheel encoder (1Vpp)									X
No additional features									
Plug-in modules determined:									

Fig. 4-1: Additional features for motor with HSF/RSF or resolver without feedback data memory

Configuration Selection for Motor with HSF/RSF or resolver without feedback data memory

Name of configuration	Table C1: Module combination								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
HA-01-01									
HA-09-01									X
HA-08-01								X	
HA-07-01							X		
HA-13-01						X			
HA-11-01				X					
HA-31-01			X						
HA-03-01		X							
HA-02-01	X								
HA-37-01			X						X
HA-05-01		X							X
HA-35-01			X					X	
HA-04-01		X						X	
HA-33-01			X				X		
HA-06-01		X					X		
HA-43-01			X			X			
HA-14-01		X				X			
HA-41-01			X	X					
HA-12-01		X		X					
HA-32-01		X	X						
HA-39-01	X		X						
HA-10-01	X	X							
HA-38-01		X	X						X
HA-36-01		X	X					X	
HA-34-01		X	X				X		
HA-44-01		X	X			X			
HA-42-01		X	X	X					
HA-40-01	X	X	X						

Fig. 4-2: Configuration Selection for Motor with HSF/RSF or resolver without feedback data memory

Motor encoder interface: sine encoder

If a motor type was specified, and an incremental scale with sine signals or an incremental sine encoder is used for the motor encoder interface, then the desired additional feature can be selected from the table *Additional features for motor with sine encoder as a motor encoder*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combinations you can determine the configuration labelling from the table *Configuration selection for motor with sine encoder as a motor encoder* to order the correct components.

If the module combination is not listed in this table, check your selected components again (motor type, motor *encoder* interface, features); some changes may be required.

Selection of features for motor with sine encoder

Features:	Table B2: Plug-in modules:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
Positioning interface		X					X		
32 universal dig. Inputs 24 universal dig. outputs			X				X		
external measuring system with rectangular signals (TTL)					X		X		
Ext. measurement system with HSF encoder (1)						X	X		
Ext. measurement system with SSI interface	X						X		
Ext. measurement system with EnDat interface (Heidenhain)	X						X		
No additional features							X		
Plug-in modules determined:							X		

(1) If the standard interface X4 is not used, there is then no need for the DFF module. The HSF feedback can be connected at the standard interface X4.

Fig. 4-3: Additional features for motor with sine encoder as the motor encoder

Configuration selection for motor with sine encoder

Name of configuration:	Table C2: Module combination:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
HA-07-01							X		
HA-21-01					X		X		
HA-33-01			X				X		
HA-06-01		X					X		
HA-15-01	X						X		
HA-48-01			X		X		X		
HA-22-01		X			X		X		
HA-34-01		X	X				X		
HA-45-01	X		X				X		
HA-16-01	X	X					X		

Fig. 4-4: Configuration selection for motor with sine encoder as the motor encoder

Motor encoder interface: Rexroth Indramat gear wheel encoder

If a motor type was specified for an application where a gear wheel encoder is used for a motor encoder interface, then you can select the desired additional features from the table *Additional features for motor with Rexroth Indramat gear wheel encoder*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combination from the table *Configuration selection for motors with Rexroth Indramat gear wheel encoder* you can determine the configuration label and order the correct components.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

Selection of features for motor with Rexroth Indramat gear wheel encoder

	Table B3: Plug-in modules:								
Features:	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
Positioning interface		X						X	
32 universal dig. Inputs 24 universal dig. outputs			X					X	
external measuring system with rectangular signals (TTL)					X			X	
Ext. measurement system with HSF encoder (1)						X		X	
Ext. measurement system with SSI interface	X							X	
Ext. measurement system with EnDat interface (Heidenhain)	X							X	
No additional features								X	
Plug-in modules determined:								X	

(1) If the standard interface X4 is not used, there is then no need for the DFF module. The HSF feedback can be connected at the standard interface X4.

Fig. 4-5: Additional features for motor with Rexroth Indramat gear wheel encoder

Configuration selection for motor with Rexroth Indramat gear wheel encoder

	Table C3: Module combination:								
Name of configuration:	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
HA-08-01								X	
HA-23-01					X			X	
HA-35-01			X					X	
HA-04-01		X						X	
HA-17-01	X							X	
HA-49-01			X		X			X	
HA-24-01		X			X			X	
HA-36-01		X	X					X	
HA-46-01	X		X					X	
HA-18-01	X	X						X	

Fig. 4-6: Configuration Selection for Motor with Rexroth Indramat gear wheel encoder

Motor encoder interface: EnDat encoder

If a motor type was specified for an application where an encoder with EnDat interface is used for the motor encoder interface, then you can select the desired additional features from the table *Additional features for motors with EnDat motor encoder Interface*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combinations you can define the appropriate configuration label for ordering the correct components in the table *Configuration selection for Motor with EnDat motor encoder interface*.

If the module combination is not listed in this table, check your selected components again (motor type, motor *encoder* interface, features); some changes may be required.

Selection of features for motor with EnDat encoder

Features	Table B4: Plug-in modules:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
Positioning interface	X	X							
32 universal dig. Inputs 24 universal dig. outputs	X		X						
external measuring system with sine signals (1Vpp or µA)	X						X		
external measuring system with rectangular signals (TTL)	X			X	X				
Ext. measurement system with HSF encoder	X					X			
Ext. measurement system with gear wheel encoder (Indramat signal specification)	X							X	
Ext. measurement system with gear wheel encoder (1Vpp)	X								X
No additional features	X								
Plug-in modules determined:	X								

- (1) If the standard interface X4 is not used, there is then no need for the DFF module. The HSF feedback can be connected at the standard interface X4.

Fig. 4-7: Additional features for motors with EnDat motor encoder interface

Configuration selection for motors with EnDat encoder

Name of configuration	Table C4: Module combination:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
HA-02-01	X								
HA-19-01	X								X
HA-17-01	X							X	
HA-15-01	X						X		
HA-27-01	X			X					
HA-39-01	X		X						
HA-10-01	X	X							
HA-47-01	X		X						X
HA-20-01	X	X							X
HA-46-01	X		X					X	
HA-18-01	X	X						X	
HA-45-01	X		X				X		
HA-16-01	X	X					X		
HA-51-01	X		X	X					
HA-28-01	X	X		X					
HA-40-01	X	X	X						

Fig. 4-8: Configuration selection for motor with EnDat motor encoder interface

Motor encoder interface: Resolver without feedback data memory + sine encoder

If a motor type was specified for an application where an resolver without feedback data memory is used for the motor encoder interface, then you can select the desired additional features from the table *Additional features for motors with resolver without FDS + sine encoder interface*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combinations you can define the appropriate configuration label for ordering the correct components in the table *Configuration selection for Motor with resolver without FDS + sine encoder interface*.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

Selection of features for motor with resolver without FDS + sine encoder

Features:	Table B5: Plug-in modules::								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
Positioning interface		X					X		
32 universal dig. Inputs 24 universal dig. outputs			X				X		
external measuring system with rectangular signals (TTL)					X		X		
external measuring system with HSF encoder (1)						X	X		
Ext. measurement system with SSI interface	X						X		
Ext. measurement system with EnDat Interface (Heidenhain)	X						X		
No additional features							X		
Plug-in modules determined:							X		

(1) If the standard interface X4 is not used, there is then no need for the DFF module. The HSF feedback can be connected at the standard interface X4.

Fig. 4-9: Additional features for motor with resolver without FDS + sine encoder

Configuration selection for motors with resolver without FDS + sine encoder

Name of configuration	Table C5: Module combination:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
HA-07-01							X		
HA-29-01						X	X		
HA-21-01					X		X		
HA-33-01			X				X		
HA-06-01		X					X		
HA-15-01	X						X		
HA-52-01			X			X	X		
HA-30-01		X				X	X		
HA-48-01			X		X		X		
HA-22-01		X			X		X		
HA-34-01		X	X				X		
HA-45-01	X		X				X		
HA-16-01	X	X					X		

Fig. 4-10: Configuration Selection for Motor with resolver without FDS + sine encoder

Motor encoder interface: gear wheel encoder with 1Vpp signals

If a motor type was specified for an application where an gear wheel encoder with 1Vpp signals is used for the motor encoder interface, then you can select the desired additional features from the table *Additional features for motors with gear wheel encoder interface with 1Vpp signals*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combinations you can define the appropriate configuration label for ordering the correct components in the table *Configuration selection for Motor with gear wheel encoder interface with 1Vpp signals*.

If the module combination is not listed in this table, check your selected components again (motor type, motor *encoder* interface, features); some changes may be required.

Selection of features for motor with gear wheel *encoder* with 1Vpp signals

Features:	Table B6: Plug-in modules:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
Positioning interface		X							X
32 universal dig. Inputs 24 universal dig. outputs			X						X
external measuring system with rectangular signals (TTL)					X				X
external measuring system with HSF encoder (1)						X			X
Ext. measurement system with SSI interface	X								X
Ext. measurement system with EnDat interface (Heidenhain)	X								X
No additional features									X
Plug-in modules determined:									X

(1) If the standard interface X4 is not used, there is then no need for the DFF module. The HSF feedback can be connected at the standard interface X4.

Fig. 4-11: Additional features for motor with gear wheel encoder with 1Vpp signals

Configuration selection for motors with gear wheel encoder with 1Vpp signals

Name of configuration	Table C6: Module combination:								
	DAG 01.2M	DEA 04.2M	DEA 08.2M	DEF 01.1M	DEF 02.1M	DFF 01.1M	DLF 01.1M	DZF 02.1M	DZF 03.1M
HA-09-01									X
HA-25-01					X				X
HA-37-01			X						X
HA-05-01		X							X
HA-19-01	X								X
HA-50-01			X		X				X
HA-26-01		X			X				X
HA-38-01		X	X						X
HA-47-01	X		X						X
HA-20-01	X	X							X

Fig. 4-12: Configuration Selection for Motor with gear wheel encoder with 1Vpp signals

5 Service & Support

5.1 Helpdesk

Unser Kundendienst-Helpdesk im Hauptwerk Lohr am Main steht Ihnen mit Rat und Tat zur Seite. Sie erreichen uns

- telefonisch: **+49 (0) 9352 40 50 60**
über Service Call Entry Center Mo-Fr 07:00-18:00
- per Fax: **+49 (0) 9352 40 49 41**
- per e-Mail: **service@indramat.de**

Our service helpdesk at our headquarters in Lohr am Main, Germany can assist you in all kinds of inquiries. Contact us

- by phone: **+49 (0) 9352 40 50 60**
via Service Call Entry Center Mo-Fr 7:00 am - 6:00 pm
- by fax: **+49 (0) 9352 40 49 41**
- by e-mail: **service@indramat.de**

5.2 Service-Hotline

Außerhalb der Helpdesk-Zeiten ist der Service direkt ansprechbar unter

oder **+49 (0) 171 333 88 26**
+49 (0) 172 660 04 06

After helpdesk hours, contact our service department directly at

or **+49 (0) 171 333 88 26**
+49 (0) 172 660 04 06

5.3 Internet

Weitere Hinweise zu Service, Reparatur und Training finden Sie im Internet unter

www.indramat.de

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit Ihrem lokalen Ansprechpartner auf. Die Adressen sind im Anhang aufgeführt.

- Verkaufsniederlassungen
- Niederlassungen mit Kundendienst

Additional notes about service, repairs and training are available on the Internet at

www.indramat.de

Please contact the sales & service offices in your area first. Refer to the addresses on the following pages.

- sales agencies
- offices providing service

5.4 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

1. detaillierte Beschreibung der Störung und der Umstände.
2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.
3. Tel./Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

5.5 Kundenbetreuungsstellen - Sales & Service Facilities

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